

## **Face Direction Estimation Using a Single Gray-Level Image**

### **ABSTRACT**

- 5 A method, apparatus, and computer program product for estimating face direction using a single gray-level image (110, 150) of a face are described. Given the single image (110, 150), a face direction can be determined by computing a nose axis (140, 180) maximising a correlation measure between left and right sides (120, 130; 160, 170) of the face. The correlation measure is computed by comparing one of the two
- 10 sides (A) with another synthetic side (C) derived from the other side (B) using symmetry and perspective transforms. Optionally, this process can be accelerated using a contrast enhancement algorithm taking advantage of the circumstances that the nose is the part of a face reflecting the most light and that this reflected light is represented as a line-like region close to the real nose axis. The computation result is
- 15 a word describing the spatial position of the face and combining height ("up", "normal", "down") and neck-rotation ("left", "frontal", "right").